

In the Claims

1. (Previously presented) An apparatus for verifying a validity of a path, comprising:

a network element included in a first autonomous system that:

constructs a directed graph comprising a plurality of nodes and a plurality of edges, a node representing an autonomous system, an edge representing a connection between two autonomous systems, the edges marked tentative;

receives an advertisement communication from each respective autonomous system within an internetwork, the advertisement comprising a list of all autonomous systems connected to the respective autonomous system;

for each advertisement received:

determines from the respective received advertisement whether the respective autonomous system claims a connection to any of the other autonomous systems within the internetwork;

determines from any other received advertisements whether any of the other autonomous systems within the internetwork claim a connection to the respective autonomous system;

for each connection claimed by the respective autonomous system with another autonomous system within the internetwork that is reciprocated by the other autonomous system, establishes that there is two-way connectivity between the two autonomous systems;

if there is two-way connectivity between the two autonomous systems, marks the edge representing the connection between the two autonomous systems as verified in the directed graph; and

if there is no two-way connectivity between the two autonomous systems, removes the edge representing the connection between the two autonomous systems from the directed graph.

2. (Previously presented) The apparatus of Claim 1, wherein the network element receives an update message from a second autonomous system, the update message including an autonomous system path, and wherein the network element verifies the autonomous system path by referencing the directed graph.

3. (Original) The apparatus of Claim 1, wherein the network element is a selected one of a group of elements consisting of:

- (a) a router;
- (b) a switch;
- (c) a bridge;
- (d) a gateway;
- (e) a loadbalancer; and
- (f) a processor.

4. (Original) The apparatus of Claim 1, wherein the network element includes a table operable to store the directed graph and to be referenced in order to verify one or more autonomous system paths that are received by the network element in one or more update messages.

5. (Original) The apparatus of Claim 1, wherein the advertisement communication is encapsulated in a border gateway protocol (BGP).

6. (Previously Presented) The apparatus of Claim 1, wherein the network communicates the directed graph to an administrator element that is operable to communicate information included within the directed graph to one or more additional network elements.

7. (Previously presented) A method for verifying a validity of a path, comprising:
constructing a directed graph comprising a plurality of nodes and a plurality of edges,
a node representing an autonomous system, an edge representing a connection between two
autonomous systems, the edges marked tentative;

receiving an advertisement communication at a first autonomous system from each
respective autonomous system within an internetwork, the advertisement comprising a list of
all autonomous systems connected to the respective autonomous system;

for each advertisement received:

determining from the respective received advertisement communication
whether the first autonomous system claims a connection to the respective autonomous
system;

determining from the advertisement communication whether the respective
autonomous system claims a connection to any of the other autonomous systems within the
internetwork, including the first autonomous system;

for each connection claimed by the respective autonomous system with
another autonomous systems within the internetwork that is reciprocated by the other
autonomous system, establishing that there is two-way connectivity between the two
autonomous systems;

if there is two-way connectivity between the two autonomous systems,
marking the edge representing the connection between the two autonomous systems as
verified; and

if there is no two-way connectivity between the two autonomous systems,
removing the edge representing the connection between the two autonomous systems from
the directed graph.

8. (Previously presented) The method of Claim 7, further comprising:

receiving an update message from a second autonomous system, the update message
including an autonomous system path, wherein the network element verifies the autonomous
system path by referencing the directed graph.

9. (Original) The method of Claim 7, wherein the first autonomous system includes a network element that includes a table operable to store the directed graph and to be referenced in order to verify one or more autonomous system paths that are received by the network element in one or more update messages.

10. (Original) The method of Claim 7, wherein the advertisement communication is encapsulated in a border gateway protocol (BGP).

11. (Original) The method of Claim 7, wherein a network element included in the first autonomous system is operable to communicate the directed graph to an administrator element that is operable to communicate information included within the directed graph to one or more additional network elements.

12. (Previously presented) A system for verifying a validity of a path, comprising:

means for constructing a directed graph comprising a plurality of nodes and a plurality of edges, a node representing an autonomous system, an edge representing a connection between two autonomous systems, the edges marked tentative;

means for receiving an advertisement communication at a first autonomous system from each respective autonomous system within an internetwork, the advertisement comprising a list of all autonomous systems connected to the respective autonomous system;

for each advertisement received:

means for determining from the respective received advertisement communication whether the first autonomous system claims a connection to the respective autonomous system;

means for determining from the advertisement communication whether the respective autonomous system claims a connection to any of the other autonomous systems within the internetwork, including the first autonomous system;

means for, for each connection claimed by the respective autonomous system with another autonomous systems within the internetwork that is reciprocated by the other autonomous system, establishing that there is two-way connectivity between the two autonomous systems;

means for, if there is two-way connectivity between the two autonomous systems, marking the edge representing the connection between the two autonomous systems as verified; and

means for, if there is no two-way connectivity between the two autonomous systems, removing the edge representing the connection between the two autonomous systems from the directed graph.

13. (Previously presented) The system of Claim 12, further comprising:

means for receiving an update message from a second autonomous system, the update message including an autonomous system path, wherein a network element verifies the autonomous system path by referencing the directed graph.

14. (Original) The system of Claim 12, wherein the first autonomous system includes a network element that includes a table operable to store the directed graph and to be referenced in order to verify one or more autonomous system paths that are received by the network element in one or more update messages.

15. (Original) The system of Claim 12, wherein the advertisement communication is encapsulated in a border gateway protocol (BGP).

16. (Original) The system of Claim 12, wherein a network element included in the first autonomous system is operable to communicate the directed graph to an administrator element that is operable to communicate information included within the directed graph to one or more additional network elements.

17. (Previously presented) Software embodied in a computer readable medium, the software comprising computer code such that when executed is operable to:

construct a directed graph comprising a plurality of nodes and a plurality of edges, a node representing an autonomous system, an edge representing a connection between two autonomous systems, the edges marked tentative;

receive an advertisement communication at a first autonomous system from each respective autonomous system within an internetwork, the advertisement comprising a list of all autonomous systems connected to the respective autonomous system;

for each advertisement received:

determine from the respective received advertisement communication whether the first autonomous system claims a connection to the respective autonomous system;

determine from the advertisement communication whether the respective autonomous system claims a connection to any of the other autonomous systems within the internetwork, including the first autonomous system;

for each connection claimed by the respective autonomous system with another autonomous systems within the internetwork that is reciprocated by the other autonomous system, establish that there is two-way connectivity between the two autonomous systems;

if there is two-way connectivity between the two autonomous systems, mark the edge representing the connection between the two autonomous systems as verified; and

if there is no two-way connectivity between the two autonomous systems, remove the edge representing the connection between the two autonomous systems from the directed graph.

18. (Previously presented) The medium of Claim 17, wherein the code is further operable to:

receive an update message from a second autonomous system, the update message including an autonomous system path, wherein a network element verifies the autonomous system path by referencing the directed graph.

19. (Original) The medium of Claim 17, wherein the first autonomous system includes a network element that includes a table operable to store the directed graph and to be referenced in order to verify one or more autonomous system paths that are received by the network element in one or more update messages.

20. (Original) The medium of Claim 17, wherein the advertisement communication is encapsulated in a border gateway protocol (BGP).

21. (Original) The medium of Claim 17, wherein a network element included in the first autonomous system is operable to communicate the directed graph to an administrator element that is operable to communicate information included within the directed graph to one or more additional network elements.